MAKING MODERN LIVING POSSIBLE

Danfoss CLX GM product range

Quick Guide

SOLAR INVERTERS

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1. Important Instructions

1.1. Introduction

This document contains detailed product information and instructions for equipment to be used with the following products:

- CLX GM
- CLX Home GM
- CLX Standard GM

This document relates to the current version at the time of printing. We reserve the right to make changes due to the introduction of new functions and improvements. The names of products and companies mentioned in this document may be registered trademarks of their respective owners.

More detailed information can be found in the user manual.
Refer to the download area at www.danfoss.com/solar for the newest instructions.

1.2. Symbols

This manual contains important information accompanied by the following symbols:

The **Attention** symbol draws attention to a risk of damage to components or danger to persons if the information provided is not observed. This type of information must be observed at all times.

Note: ✍
The **Note** symbol marks supplementary information for improving operating processes as well as user tips.

1.3. Safety Instructions

It is assumed that the reader is familiar with the rules and regulations for electrical equipment and connection to the mains power network. Particular attention must be paid to general safety regulations for working with electrical systems.

Observe the safety instructions below to prevent injury to persons and damage to connected equipment.

Contact with electrically conductive parts after disconnection from the mains supply can be dangerous. **Do not connect the equipment to the mains supply before installation.**

Equipment must be installed only in protected/dry environments.
Do not use metallic/pointed/sharp instruments to access the enclosure.
Prevent cables and terminals from being exposed.
The power plug must be accessible at all times.
Qualified personnel only must perform service.
Equipment must only be operated at the rated supply voltages (12-24 VDC, correct polarity). A suitable power supply unit is included in the scope of delivery.

Note: ✍
Observe the manufacturer's instructions regarding the handling of power supply units (especially switching units).
Observe the manufacturer's instructions regarding the handling of inverters.

2. Product Overview

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2.1. Product Description

The CLX GM product range is used for power management of PV plants and acquisition and distribution of system data.
EEG 2012 requires PV plants with a capacity of 30 kWp or more to have an interface to the energy supplier for the specific remotely controlled reduction of feed-in power. Plants below 30 kWp have the option of continuously reducing feed-in power to 70% of the installed capacity, but this may reduce profitability significantly.
PV plants above 100 kWp initially put into service on or after 1 July, 2012, must be equipped with a power reduction system. This requirement may be imposed retroactively on PV plants from 30 kWp to 100 kWp, initially put into service on or after 1 January, 2009.

Product Features			
	CLX GM	CLX Home GM	CLX Standard GM
Inverter type	TLX Pro and TLX Pro+	TLX, TLX+ and ULX	TLX, TLX+ and ULX
Number of inverters	1-100	1-3	1-20
Built-in web interface	Yes	Yes	Yes
Display of current plant status	No	Yes	Yes
Grid management	Yes	Yes	Yes
Scan for connected inverters	No	Yes	Yes
Configuration of grid management via built-in web interface	No	Yes	Yes

CLX GM
Grid management of PV plants with TLX Pro or TLX Pro+ inverters is handled by the CLX GM products and the master functionality of the TLX Pro and TLX Pro+ inverters.
The CLX GM box is connected directly to the output of a radio ripple control receiver. The receiver has 4 digital outputs K1-K4, which are used by the grid operators for signalling either power reduction or reactive power setpoint commands. The CLX GM box reads the current relay state and via its Ethernet connection to the inverter network it broadcasts a message to the master inverter. Therefore all configuration of how to react upon a certain relay state is performed directly in the master inverter itself. The CLX GM box is simply connected to the receiver and the inverter network and requires no additional configuration.

CLX Home GM and CLX Standard GM
Grid management of PV plants with ULX, TLX or TLX+ inverters is handled by either the CLX Home GM or CLX Standard GM, depending on the size of the PV plant. The CLX Home GM or CLX Standard GM is connected directly to the output of a radio ripple control receiver. The receiver can have up to 4 digital outputs and 2 analogue 4-20 mA outputs, which are used by the grid operators for signalling either power reduction or reactive power setpoint commands.
The CLX Home GM or CLX Standard GM converts the signals from the grid operator into control messages sent directly to the inverters via the RS485 network. All configuration is done directly via the built-in web interface.

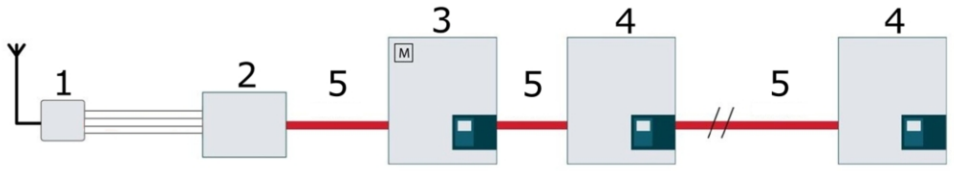

Illustration 2.1: Grid Management for Solar Power Plant

Legend	
1	Radio ripple control receiver
2	CLX GM, CLX Home GM or CLX Standard GM
3	CLX GM: Master inverter, TLX Pro, TLX Pro+ CLX Home GM and CLX Standard GM: ULX, TLX, TLX+ inverter
4	CLX GM: Follower inverters, TLX Pro, TLX Pro+ CLX Home GM and CLX Standard GM: ULX, TLX, TLX+ inverter
5	CLX GM: **Ethernet** CLX Home GM and CLX Standard GM: **RS485**

The equipment is supplied with the following items:

- CLX GM, CLX Home GM or CLX Standard GM
- Mounting bracket with screws
- Accessories (power supply, network cable standard RJ45 TP10/100 cat 5e)
- Packaging
- Instructions

2.2. System Requirements

2.2.1. Intended Use

The CLX GM product range is intended solely for grid management with Danfoss inverters.

Drilling holes in the equipment or mechanical modifications will damage the equipment and invalidate the warranty.

2.2.2. System Requirements

The CLX GM product range has a built-in web interface, for display of simple status information and configuration.

The following web browsers are recommended for use with the CLX GM product range:

Internet Explorer®	Version 6 or later
Firefox®	Version 2 or later

3. Technical Description

3.1. CLX GM Product Range

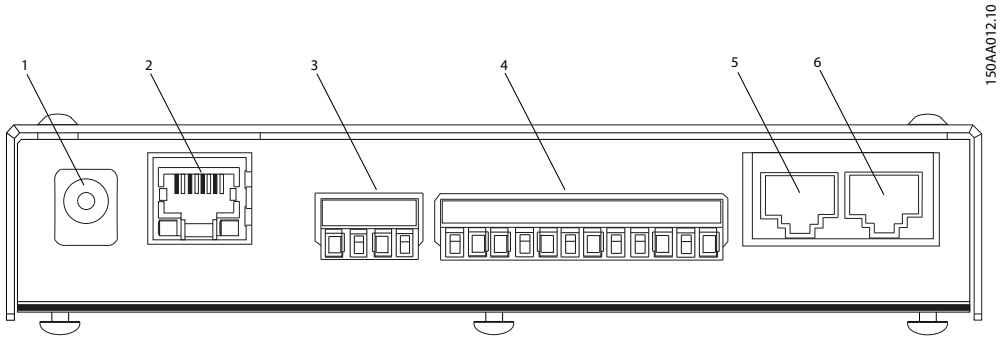

Illustration 3.1: CLX GM Product Range - Connectors (Bottom)

Legend	
1	Power supply with circular connector (12–30 VDC)
2	Ethernet port for LAN
3	Not used
4	Input terminals, 12 lines: 2 x voltage (+) 4 x relay input (S01, S02, S03, S04) 4 x analogue input 4-20 mA (A1, A2)*)
5 & 6	RS485 for connection to the inverter network

*) Not used in CLX GM.

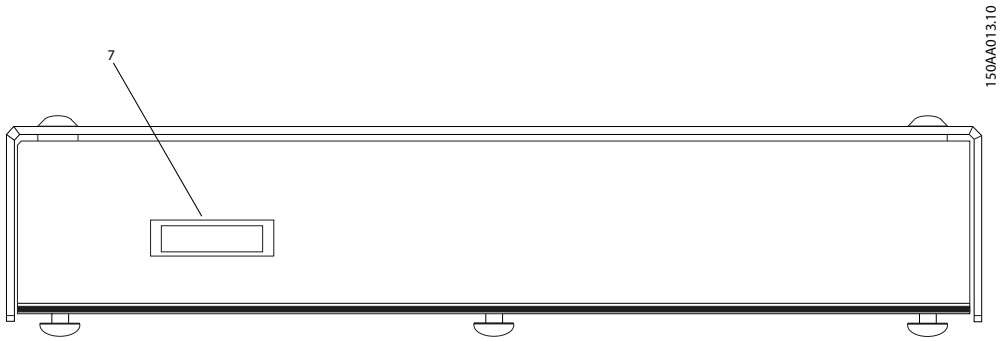

Illustration 3.2: CLX GM Product Range - Connectors (Top)

Legend	
7	Micro SD slot: not used in CLX GM

3.2. Display

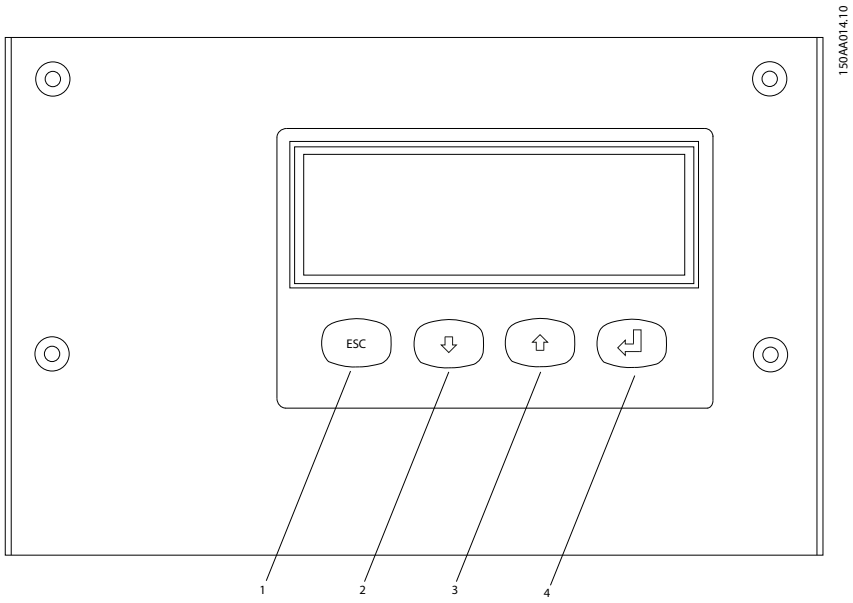

Illustration 3.3: Front View

Legend	
1	Cancel/Back
2	Down
3	Up
4	Confirm

4. Installation

4.1. Installation

The CLX GM product range must be installed indoors or in an electrical cabinet. It can be mounted either horizontally or vertically (connectors facing downwards) on a mounting rail system or on a wall using the supplied wall bracket.

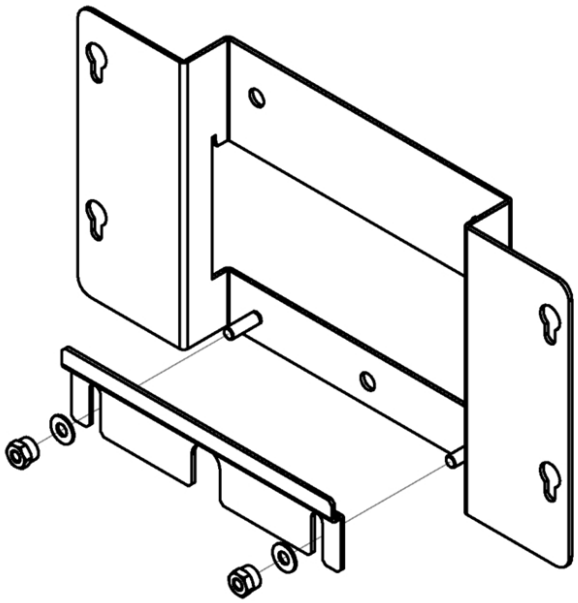

Illustration 4.1: Wall Bracket

Fit the box to the bracket by clipping the screws on the back of the unit into the bracket. When mounting the equipment, ensure free access for cable connections from below. Use cable anchors for strain relief.

Like all electronic equipment, all products of the CLX GM product range must be protected from humidity, in particular condensation.

4.2. Signalling of Power Management

Signalling of power management is handled by the ripple control receiver of the electricity company. The connection between the ripple control receiver and the CLX GM product range is type-dependent. It is described here using a Landis+Gyr® receiver as an example.

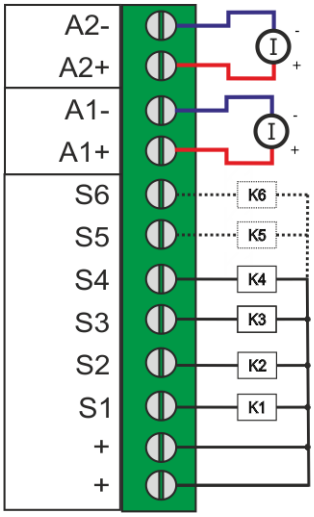

Illustration 4.2: Power Management - Connections

The ripple control receiver is connected as follows:

Input Terminal Strip	Function	Ripple Control Receiver Connector (K)
+S	12-30 VDC	K1
-S1	Relay input 1	
+S	12-30 VDC	K2
-S2	Relay input 2	
+S	12-30 VDC	K3
-S3	Relay input 3	
+S	12-30 VDC	K4
-S4	Relay input 4	
+S	12-30 VDC	K5
-S5	Not used	
+S	12-30 VDC	K6
-S6	Not used	
A2-	12-30 VDC	(0)4 .. 20 mA
A2+	Analogue input *)	
A1-	12-30 VDC	(0)4 .. 20 mA
A1+	Analogue input *)	

Table 4.1: Ripple Control Receiver - Connections

*) Not used.

To avoid damage to any product of the CLX GM product range and the ripple control receiver, the connection must only be made by an authorised and suitably trained electrician.

4.3. Connection to the Inverter Network

4.3.1. CLX Standard GM and CLX Home GM

The CLX Standard GM and the CLX Home GM are connected to the inverters via the RS485 ports (see the inverter manual).

Proceed as follows:

- Plug the RJ45 terminator (black) into one of the RJ45 sockets of the CLX Standard GM or CLX Home GM box.
- Using a RJ45 network cable, connect the final inverter to the free RJ45 socket of the CLX Standard GM or CLX Home GM box.
- Terminate the inverter bus at the far end with the second RJ45 terminator (see the inverter manual).

4.3.2. CLX GM

The CLX GM box is connected to the master inverter of the inverter network via LAN interface.

5. Getting Started

CLX GM

Install the CLX GM box as described in the previous section.

- Connect the power supply to the CLX GM box and the mains supply.

Administrator access:

- Use the display to configure the following. Press 'Enter', navigate to 'Configuration':
  - Date and time setting

  For further information regarding network configuration, refer to the available manuals. At delivery, the network configuration is set to DHCP.
- For configuration via the web interface, refer to the available manuals.

Note: ✍
Detailed configuration of power management is done via the grid management menu of the master inverter.

CLX Home GM and CLX Standard GM

Install the CLX Home GM or CLX Standard GM as described in the previous section.

- Connect the power supply to the box and the mains supply.

Administrator access:

- Use the display to configure the following. Press arrow down, then 'Enter' to enter 'Configuration':
  - Date and time setting
  - Network scan

  For further information regarding network configuration, refer to the available manuals. At delivery, the network configuration is set to DHCP.
- For configuration via the web interface, refer to the available manuals.

Note: ✍
Detailed configuration of power management is done via the power management menu of the CLX Home GM or CLX Standard GM box.

Note: ✍
Network settings - Dynamic IP address (DHCP)
This requires a DHCP server in the local network. In this case, the CLX GM box obtains its network settings from the DHCP server.

6. Technical Data

CLX GM Product Range	
Processor	32-bit microcontroller, 96 MHz
Display	Display 4x20 LCD ASCII backlit
Interfaces	CLX GM: LAN (Ethernet 10/100 Mbit) CLX Standard GM and CLX Home GM: RS485
Terminal strips 12-way	4 + 2*) x digital input (self-powered), without galvanic isolation for external floating contact 2 x 4-20 mA input: analogue input, without galvanic isolation*)
Enclosure	2-part, fanless metal enclosure for rail mounting (IP20)
Weight	330 g net (without accessories and external AC mains adapter)
Humidity	< 80% non-condensing
Ambient humidity	Indoor/switch cabinet installation
Operating temperature	0 to 50 °C
Dimensions (without screws and mounting plate)	160 mm x 100 mm x 31 mm (W x H x D)
Power	12–30 VDC
Standby Power Consumption	Approx. 1 Watt

*) Not used.

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